Claims

The following claims are intended to serve the usual function of pointing out and distinctly claiming the applicant's inventions (35 U.S.C. §112).

1. A method of targeting and enhancing therapeutic or palliative treatments including, without limitation, physical, chemical, radiative or gene therapies applied for the treatment and prevention of diseases,

which method comprises the step of modulating the response protective elements in cells, tissues or organs with selected time exposures of electromagnetic (EM) fields having frequencies within a range of approximately 10 Hz to approximately 5 GHz,

wherein the time and magnitude of the exposure is dependent on the size of the diseased tissues or organs so as to enhance the endogenous cellular protective responses of normal tissues and/or suppress the endogenous cellular protective responses of diseased tissues.

2. A method as in claim 1 wherein the disease is cancer.

3. A method as in claim 2 wherein the EM field treatment is administered prior to treatment with anti-cancer agents.

4. A method as in claim 3 wherein said EM field exposures are administered over a period of a minimum of 2 days, with a minimum of one exposure each day, with each exposure duration lasting a minimum of 20 minutes.

5. A method as in claim 4 wherein the EM exposures are administered over a period of 4 days.

6. A method as in claim 4 wherein each exposure duration is 1 hour.

7. A method as in claim 2 wherein the EM field treatment is administered both prior to and following treatment with anti-cancer agents.

8. A method as in claim 7 wherein the EM field exposures are administered over a period of a minimum of 2 days both prior to and following treatment with anti-cancer agents, with a minimum of 1 exposure each day, with each exposure duration lasting a minimum of 20 minutes.

9. A method as in claim 8 wherein the EM field exposures are administered over a period of 4 days.

10. A method as in claim 8 wherein the duration of each exposure lasts 1 lour.

11. A method as in claim 1 wherein the disease is any autoimmune dysfunction.

12. A method as in claim 11 wherein the EM field exposures are done at least 5 days per week, with a minimum of 1 exposure each day, with each exposure duration lasting a minimum of 20 minutes.

13. A method as in claim 12 wherein the EM field exposures are done 7 days per week.

14. A method as in claim 12 wherein each exposure duration lasts 1 hour.

15. Apparatus for establishing a plurality of electromagnetic (EM) fields to provide a region of bio-effectiveness in a human or animal body, the apparatus comprising;means to generate a first EM field encompassing in part a region in a human or animal body wherein bio-effectiveness is to be achieved,

means to generate at least one additional EM field also in part encompassing in part said region,

means for modulating the first field to cause it to be at a first magnitude for a first period of time and at a second magnitude for a following period of time, with changes occurring within approximately 10 second intervals,

means for modulating the additional field to cause it to be at a first magnitude for a first period of time and at a second magnitude for a following period of time, with changes occurring within approximately 10 second intervals,

means for controlling said modulation means to cause the magnitude of the first EM field and the magnitude of the additional field at all given times to be complementary in respect of time,

whereby within said region the respective fields will provide a combined field having a predetermined pattern of limited differences in magnitudes but outside the region the respective fields will alternate between said first and second magnitudes.

16. Apparatus as in claim 15 herein said predetermined pattern of magnitudes within said region does not vary from continuous by more than approximately 25 percent of the maximum magnitude of the respective fields.

17. Apparatus as in claim 15 wherein the means for generation of said first field is a Helmholtz pair of coils.

18. Apparatus as in claim 15 wherein the means for generation of said additional field is a single coil.

19. Apparatus as in claim, 15 wherein the means for generating said additional field is a Helmholtz pair of coils.

20. Apparatus as in claim 15 wherein the axes of the coils are at an angle to one another.

21. Apparatus as in claim 20 wherein the angle is a right angle.

22. Apparatus as in claim 15 wherein the field generating means for the first EM field and the field generating means for the additional EM field differ at least to the extent that at least one of the fields will have a magnitude distance gradient.

23. Apparatus for focusing the biological effect on cells, tissues or organs with an applied EM field resulting from the superimposition of two biologically ineffective fields when applied separately, the fields being generated from a primary source configuration producing a spatially time varying EM field and from a secondary source configuration producing a spatially uniform time varying EM field of the same frequency and waveform as the primary source configuration, with the primary and secondary field amplitudes being within 25% of being equal. only on the targeted cells, tissues and organs.

24. Apparatus as in claim 23 wherein the time varying fields are uniform.

25. Apparatus as in claim 23 wherein at least one of the time varying fields is non-uniform.

26. Apparatus as in claim 23 wherein both of the time varying fields are non-uniform.

27. Apparatus as in claim 23 wherein the primary source configuration produces EM field exposures with on and off cycling with a maximum of 5 seconds time on and a maximum of 5 seconds time off, and the secondary configuration produces EM field exposures which are off when the primary exposures are on, and on when the primary exposures are off.

28. Apparatus as in claim 27 in which the times on and off are of 2 seconds duration.

29. Apparatus as in claim 23 wherein the time and magnitude of the exposure from each of the source configurations is no less than 2 microTesla and no greater than 2000 microTesla.

30. Apparatus as in claim 23 wherein the EM field magnitude corresponds to a radiative energy of at least 1.0 mW/cm squared.

31. Apparatus as in claim 23 wherein the secondary source configuration comprises 2 quadrupoles which provide maximum fields along the symmetry axis thereof, and wherein the field from one quadrupole is on for a maximum time of 5 seconds when the field from the other quadrupole is off for a maximum time of 5 seconds.

32. Apparatus as in claim 23 wherein the maximum times are 2 seconds.

33. Apparatus as in claim 31 wherein the quadrupoles are coaxial.

34. Apparatus as in claim 31 wherein the quadrupoles have partially shielded windings.

35. Apparatus as in claim 34 wherein the shielded windings are shielded away from the axis thereof.

36. Apparatus as in claim 23 wherein the secondary source configuration is comprised of 2 quadrupoles in spatial and phase quadratures provide a maximum circularly polarized field along the symmetry axis thereof, and wherein the field is on for a maximum time of 5 seconds.

37. Apparatus as in claim 23 wherein the quadrupoles have partially shielded windings.

38. Apparatus as in claim 37 wherein the windings are shielded away from their axis.

39. Apparatus as in claim 23 wherein the field on time is 2 seconds.

40. Apparatus for use in anti-cancer treatments, comprising means for exposing both normal and diseased tissues to EM fields for a minimum of 20 minutes, with the field exposure ending at a maximum of 10 hours prior to treatment with therapeutic agents.

41. Apparatus as in claim 40 wherein the exposure is for at least 1 hour.

42. Apparatus as in claim 40 wherein the field exposure exists for 1 hour.

43. Apparatus as in claim 40 wherein the magnitude of the exposure from the EM fields is dependant on the field type used with a preferred level of no less than 2 microTesla and no greater than 2000 microTesla.

44. Apparatus as in claim 40 and including means for administering the EM fields in conjunction with prior focusing onto the diseased tissue alone.

45. Apparatus for exposure of EM fields to tissue, including means for generating circular polarized fields for a minimum of 20 minutes and a maximum of 10 hours, the generating means including two EM field source configurations in different orientations.

46. A method of establishing a plurality of EM fields to provide a region of bio-effectiveness in a human or animal body, the method comprising the steps of:

generating a first EM field encompassing at least in a part a region in a human or animal body wherein the bio-effectiveness is to be achieved,

generating at least one additional EM field also encompassing at least in part said region,

modulating the first field to cause it to be at a first magnitude for a first period of time and at a second magnitude for a following period of time, with changes occurring within approximately 10 second intervals,

modulating the additional field to cause it to be at a first magnitude for a first period of time and at a second magnitude for a following period of time, with changes occurring within approximately 10 second intervals, and

controlling the modulations to cause the magnitude of the first EM field and the magnitude of the additional field at all give times to be complementary in respect of time,

whereby within said region the respective fields will provide a combined field having a predetermined pattern of limited differences in magnitudes but outside the region the respective fields will alternate between said first and second magnitudes.